

round with the souls of healthy boys and girls it is a different matter, and teachers have no more right to experiment upon them in psychical matters than to make them the vile body for testing the properties of a patent nostrum. It may be true, as Dr. Crichton Miller has pointed out, that in nineteen out of twenty cases examined by the expert analysts the results point to faulty upbringing, either at home or at school, but it must be borne in mind that these twenty cases are not normal or typical in any way. When Dr. Mary Bell says there is no sin in a child helping itself to the contents of the mother's purse in order to buy presents for a teacher, this is simply playing fast and loose with the distinctions between right and wrong. Most homes and most schools will be well advised to stick to the Ten Commandments. If a child gets into serious trouble or is not healthily happy, there is a clear case for psychotherapy. Every schoolmaster of experience knows how helpful it may be in suggesting a hopeful method of treatment, for there were cases of shell-shock among children in the raid areas as well as among soldiers at the Front; and so long as boys are boys there will be cases of practical jokes, such as those which drove the poet Gray out of Peterhouse at Cambridge, and there will be cases of bullying, though these are now, happily, very rare. But for the normal treatment of normal school-life, the best training of the unconscious life, as Mr. Talbot said, is through the school games, school camps, scouting, and everything which enables a child's psychical faculties to function freely in relationship both to his teachers and to his fellows. Inasmuch as every child does not find itself in cricket, football, and hockey, it is well to widen the field of opportunity and to offer as large a variety as possible, so that no child in any school may live such a cowed life as Cowper lived at Westminster.

Prof. Percy Nunn's address on testing intelligence was as full of humour as of practical help and suggestion. Clearly the secondary school needs a certain *quantum suff.* of knowledge as well as of intelligence, and therefore written examination cannot be superseded in the selection of free-place holders. Both these forms of test bring out the child that has the power of rapid mental mobilisation, and the ablest child of all may very likely fail to shine. "Sentimental Tommy" failed to win his place on the list because he spent half the time available in thinking out the exact word which he wanted to fit his thought. Clearly the consummate artist in words is not a successful examinee. There is, in addition, the child who thinks below the surface of things, whom psychologists call the "introvert." He will take the question proposed and look at it in its bearings in relation to other deep thoughts which occupy his mind, and, as likely as not, he will want to reformulate the question altogether before he sets himself to answer it. As Prof. Nunn admitted, our present methods pass over this child; a Newton or a Coleridge would in all probability fail to win a scholarship. This is one point which calls for further work for the psychologists. Profs. Terman and Thorndyke have not yet faced this question, and the American Army had probably no use for a Coleridge or other poetic soul. This is only one of many questions which call for further research. It is important to be able to measure the vital force of the competitor, for a fund of vitality is quite as important for effectiveness in study, and, indeed, in life in general, as intelligence. It would be interesting to know how much deep breathing and cardiac strength have to do with that tenacity of purpose which so often wins through to high achievement, when mere brilliance of intellect fails because it is not backed by strength of perseverance.

The Mathematical Association.

AT a crowded annual meeting on January 4, Prof. A. S. Eddington gave an account of relativity. Those who wish to inform themselves on this subject will naturally go to Prof. Eddington's attractive book, "Space, Time, and Gravitation." No experiments to determine the motion or whereabouts of the æther had ever led to any but a negative result, as if one solving an equation should end up with the disappointing result $0=0$. The view had therefore been put forward that there were certain compensating influences concealing the motion of the æther from detection. But Einstein had dared to take up the attitude of Betsey Prig in the matter of Mrs. Harris, "I don't believe there's no such a person!" The party of Mrs. Harris, however, protested against being called upon actually to produce her.

Two points of pedagogic importance were made. First, there is geometry. In Prof. Eddington's opinion geometry is not the science of space relations in an empty world, but the science of space relations of material objects; its fundamental assumptions are to be ascertained by measurements made on such objects. From this it would follow that the philosophical way to begin the study of geometry is by playing with mathematical instruments and bits of cardboard. This is what teachers have been discovering, beginning at the other side of the problem—beginning, that is, with the boy into whom they have to insert learning. Prof. Eddington reaches the same conclusion by considering the nature of the learning that is to be inserted into the boy. So the two sets

of workmen meet in the middle of the tunnel and the line is clear for traffic.

Secondly, there is dynamics. Consider the case of a pendulum. On one side of the equations we have been accustomed to write the forces, including gravity. On the other we write inertia and acceleration, including the acceleration towards the centre. But the last term could algebraically be written on the force side, with sign reversed; it would be identified with what has been known popularly as centrifugal force. Teachers have generally been rather prudish about this term, but Prof. Eddington assures us that centrifugal force and weight are equally real or unreal; it would appear, then, that they should be on the same side of the equation. (But which side?) Similarly, the passenger walking along the aisle of an accelerating tube-carriage is justified in considering himself in equilibrium under a pressure from the floor and a gravitational force equally inclined to the vertical; and gravity is, in practice, not disentangled from the centrifugal force of the earth's rotation.

Dr. Brodetsky followed with a paper proposing to inject fresh blood into dynamics by using the aeroplane. He explained that the problem could be so simplified that, after a year's study of dynamics, the student could work problems on the motion of aeroplanes, including climbing, *vol plané*, and banking. We shall look forward to seeing these suggestions worked out in detail in a forthcoming issue of the *Mathematical Gazette*.

The Rev. S. H. Clarke, of Tonbridge School, pleaded for a more intelligent handling of the older non-mathematical boys, especially those of proved ability in classics. They should not be allowed to drop mathematics, nor should their time be spent in trying to attain an unattainable degree of dexterity in the bits of mathematics that they have already learned to dislike. On the contrary, they should be introduced in a superficial and literary manner to new mathematical regions; here they will find fresh inspiration, and eventually form a public able to view mathematical achievements with sympathy and appreciation. Mr. Durrell recorded that such a scheme has been in operation at Winchester for two years; that it is compatible with success in the school certificate examination; and that examination results on the wider field are bound to be bad. But this does not matter in the least.

Prof. Whittaker, the retiring president, indicated the danger that mathematicians might break up into two non-communicating groups: researchers who do not teach much, and teachers (mainly schoolmasters) who do not research. This was by no means necessary, as the Edinburgh Mathematical Society does useful research work and is composed almost entirely of schoolmasters. There were many problems which might be attacked with fruitful results by schoolmasters whose knowledge does not go beyond an honours course. He described three fields in which oil might be struck near the surface with a very moderate drilling equipment:—(1) A method allied to

nomography, at present almost unexplored; (2) the theory of skew determinants and Pfaffians; and (3) the solution of partial differential equations by means of integral equations.

Canon J. M. Wilson, the new president, gave an account of the efforts of mathematical reformers before the foundation of the Association for the Improvement of Geometrical Teaching, now the Mathematical Association (the fiftieth anniversary of this event occurs this year.) He was asked by Dr. Temple, then Headmaster of Rugby, to produce a reformed geometry text-book; this he did after consulting the leading Continental works on the subject. In appreciation of his work he received an address in Edinburgh signed by Members of Parliament, professors, and other leading men. Those on whose shoulders Canon Wilson's mantle has fallen have done little more than to rediscover or develop the ideas put forward by himself and other pioneers more than fifty years ago. Canon Wilson will be pleased to learn that his ideas have now been accepted by all the important examining bodies except London University.

Miss E. B. Read told an interesting story of a recent visit to lycées in Paris and the French provinces—girls' schools, all of them; in boys' schools she never penetrated beyond the director's office. She was impressed by the burden of home-work in these lycées, sometimes occupying the girls up to midnight. This she associated with the predominantly oral method of classwork, little time being spent in working examples in class.

C. G.

The Geographical Association.

THE annual meetings of the Geographical Association were held in the London Day Training College, Southampton Row, on January 7-8. The session opened with a discussion on historical geography, led by Messrs. Fairgrieve and Jervis. Several historians were present, and they agreed with geographers that each subject demands not only a special and intensive study of its own facts, but also a special and differing attitude of mind. Every geographer must have sufficient knowledge of historical facts and conditions to explain those links of the past which last on into the present, and are thus necessary to the proper understanding of present geographical conditions. Prof. J. L. Myres said that both history and geography were concerned in the effort to help young folk to exploit the general experience of humanity for their own benefit and that of their fellow-citizens, and that it was therefore imperative that the two sets of aspects should be presented harmoniously and instructively.

In the discussion on geography in continuation schools the main point which emerged was that geography was being given a place in the L.C.C. schools because it was felt that it gives a training in good citizenship, in a habit of wide outlook, and in interest in the district in which the pupil lives or works.

Dr. Unstead gave a remarkably able exposition of the difficulties and possibilities which face the teacher of geography in his attempts to deal with such international problems as the altered environmental and psychological conditions in eastern Europe, the racial question on the Pacific fringes, and the atmosphere in India and Egypt. While it would obviously be crude to discuss these things in a political way, even in the upper forms of secondary schools, it is yet essential that these aspects of modern human geography shall

be presented, and the only safe way is to show the contrasted *ideals* rather than the detailed claims of each nationality.

Dr. Haddon, whose valuable expedition to the Torres Strait was one of the outstanding scientific events of the last generation, delivered an illustrated lecture on racial and cultural distributions in New Guinea, furnishing thereby a first-rate example of the methods of distributional study.

Prof. Gilbert Murray gave his presidential address on the evening of January 8. He emphasised the fact that in every epoch of history there has been a division of humanity into the select few who understand the world and the barbaric multitude who are without the precinct—the Hellenes and the Barbarians, in medieval times the world of Christianity, and without the pale the Jews and infidels. The essential mark of the man "without the precinct" is that the motives which underlie his actions are misunderstood, or even not considered at all. Geography should help to remove that spirit of ignorance and misunderstanding from the world. For geographers the present world-situation is of special interest, for not only have the Great Powers been compelled to try to get this spirit of mutual geographic understanding, but also the whole *orbis terrarum* is meeting. China and Peru are members of that League the business of which is the common good of humanity, the securing not merely of *peace*, but also of goodwill between every nation of the world, whatever its status.

The lectures given by Dr. Haddon and Prof. Gilbert Murray will be published in the spring number of the *Geographical Teacher*, which is sent post free to all members of the Geographical Association. The annual subscription is 5s., and the address of the central offices is 1 Marine Terrace, Aberystwyth.